



# 2005 Minerals Yearbook

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## MONTANA

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# THE MINERAL INDUSTRY OF MONTANA

**This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Montana Bureau of Mines and Geology for collecting information on all nonfuel minerals.**

In 2005, Montana's nonfuel raw mineral production was valued<sup>1</sup> at \$847 million, based upon annual U.S. Geological Survey (USGS) data. This was an increase of \$226 million, or more than 36%, from the value of 2004, which in turn was up \$127 million, or up nearly 26%, from that of 2003. The State rose in rank to 24th from 26th among the 50 States in nonfuel raw mineral production value and accounted for more than 1.5% of the U.S. total. Yet, per capita, the State ranked 5th in the Nation in the value of its nonfuel mineral production; with a population of about 936,000, the value of production was \$906 per capita.

Metallic minerals accounted for nearly 77% of Montana's total nonfuel mineral production value in 2005. Molybdenum concentrates, copper, platinum, and palladium were, in descending order of value, the State's leading nonfuel minerals, followed by construction sand and gravel, portland cement, and gold, the combined total of which accounted for nearly 98% of the State's total nonfuel mineral value. In 2005, 17 of Montana's 21 nonfuel mineral commodities increased in value, the largest increases being those of molybdenum concentrates, copper, and gold, which were up by more than \$120 million, about \$50 million, and more than \$40 million, respectively (table 1). The average unit values for each of the three showed significant increases, especially those of molybdenum concentrates and copper. Production for all three also significantly increased, the largest increase being in the production of gold, which was up by substantially more than 200%.

The prices for copper and for molybdenum concentrates have risen markedly during the past 2 years. The single highest increase in value in molybdenum concentrates resulted from the dramatic increase in the commodity's prices during 2004-05, which continued an upward trend that began in December 2002 that continued on throughout 2003 and 2004. As reported in *Platts Metals Week*, the time-weighted average price of molybdc oxide rose from \$8.27 per kilogram (kg) (reported as dollars per pound of contained molybdenum) in 2002, \$11.75 per kg in 2003, \$36.73 per kg in 2004, and nearly doubled to \$70.10 per kg (about \$32 per pound) in 2005. In June 2005, the molybdc oxide price reached its highest point of the 4-year run of \$82.54, and then followed a generally downward trend during the remainder of the year to close at \$61.84. Molybdenum concentrate prices had stayed relatively level during the early months of 2006.

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<sup>1</sup>The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2005 USGS mineral production data published in this chapter are those available as of December 2006. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

Smaller yet significant increases also took place in the total values of portland cement and silver, and the unit values of each also increased significantly. The largest decrease in value took place in palladium. A 3% decrease in the production of palladium resulted in a drop of nearly \$15 million, or more than 14%, in its value from that of 2004 (table 1).

In 2005, Montana continued to be the only State to have primary palladium and platinum mine production. It also continued to be first in the quantity of talc produced, third in bentonite, fourth in zinc, fifth in molybdenum concentrates and silver, and sixth in gemstones. The State was third of three industrial garnet-producing States, rose in rank to fifth from eighth in gold, decreased to fifth from fourth in copper, and remained a significant producer of construction sand and gravel.

The Montana Bureau of Mines and Geology<sup>2</sup> (MBMG) provided the narrative information that follows. Production and other data in the following text are those reported by the MBMG, based upon its own surveys and estimates. The data may differ from some production figures reported by the USGS.

## Exploration and Development

Exploration activity in 2005 increased to 15 projects, more than doubling the 7 projects carried out in 2004. However, only 5 of the 2005 projects made it to a level of drill sampling and ore evaluation. Exploration for precious and base metals, including copper, was of primary interest. Other exploration activity included that for iron, garnets, and gemstones. Most of the exploration activity was accomplished by local residents seeking to establish a profitable business. A few Canadian companies also were involved in some exploration projects.

North of Butte, OT Mining Corporation, of Montreal, Quebec, Canada, staked an additional 383 claims, which increased the size of its Ruby property to about 54 square kilometers. The company completed an extensive geochemical and geophysical sampling program and drilled three holes into a copper-porphyry system. One hole showed nearly 430 meters (m) of subeconomic copper mineralization. The results of the geophysical tests indicated targets somewhat north of the existing drilling program. More geophysical work was scheduled for 2006.

Elkhorn Goldfields, Inc., (a subsidiary of Elkhorn Goldfields, LLC, an affiliate of Calim Private Equity, LLC, Aspen, CO) continued a long-term delineation drilling program on a series of copper-gold (magnetite-pyrrhotite) skarns east of Boulder. Drilling results identified 540,000 metric tons (t) of resource grading up to 0.5% copper and 9.6 grams per metric ton (g/t) (0.28 troy ounces per short ton) gold. The company was designing a decline that would facilitate further definition

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<sup>2</sup>Robin B. McCulloch, Associate Research Mining Engineer, authored the text of the State mineral industry information provided by the Montana Bureau of Mines and Geology.

drilling as well as bulk testing of the skarns. In earlier vertical drilling, Elkhorn had identified several deposits, and also had noted a few small satellite ore bodies that were previously unknown.

West of Silver Star, Coronado Resources, Ltd., Vancouver, British Columbia, Canada, drilled five holes at the Broadway-Victoria Mine (Madison Gold project). Results in the first four holes ranged from about 1% to nearly 4% copper in 1- to 8-m intercepts. The fifth hole intersected 20 m of resource grading 19.24% copper, including 8 m of resource grading 41.05% copper. Concentrations in this hole ranged from 9.8 to 19.6 g/t gold over 1.5- to 4.5-m intervals. The deposit is a skarn-hosted system that appears to have potential for a copper supergene zone.

Golden Arrow Mining Company in Roy, Fergus County, mined a 180-t underground bulk sample from its deposit on Linster Peak in the Judith Mountains east of Hilger. Drilling results from the deposit have indicated a zone width of 1.8 to 2.4 m with grades ranging from 6.9 to 10 g/t gold. Full results on the bulk sample were not available by yearend.

Mandalay Ventures Ltd., Vancouver, British Columbia, Canada, tested for the boundaries of a previously exposed pay zone in the Quartz Creek placer gold deposit near Superior. The infrastructure was developed for an exploration program, but beyond some minor testing along the edges, the testing was not completed.

In the Elliston area, exploration was conducted for placer gold in the drainage from the Uncle Ben Gulch. This deposit has yielded some outstanding nuggets in recent years using metal detectors. Results of the current tests were not available by yearend.

In the Garnet area, Granite County, Contact Mining Company processed part of the Grant and Hartford gold-silver mine tailings through their mill. Results were reportedly encouraging and further development was expected.

East of Jefferson City, placer tests were conducted on the Golden Age property near Bullock Hill. Earlier studies identified the existence of resources in a residual placer deposit on the hillside but did not fully explore the limits or grades of the deposit.

West of Philipsburg, tests were conducted to determine the presence of sapphire in Little Moffit Gulch. The trenches showed significant geologic potential for sapphire but because of a limited water supply, processing was delayed until 2006.

South of Melrose, Barton Mines Company, LLC, Glens Falls, NY, auger-drilled the garnet tailings at the reclaimed mill site of the General Electric Company, Fairfield, CT. This facility had been used to process ore from the Browns Lake and Calvert Hill tungsten properties. Results of previous tests of this waste material have shown it to be very effective for water-jet cutting of various steels and aluminum. The drilling program outlined a garnet resource in excess of 1.4 million metric tons (Mt).

West of Marysville, Montana Molybdenum, Inc. (a wholly owned subsidiary of United Bolero Development Corp., Vancouver, British Columbia, Canada) conducted a 50-hole percussion drill program on the Bald Butte molybdenum deposit. Results ranged from 0.049% to 0.217% molybdenum with identified resources of about 460,000 t. In December, the

company shipped some test lots to the Contact Mining Company mill in Philipsburg.

Near Nye, Trend Mining Company, Coeur d'Alene, ID, conducted drilling tests at the Mountain View, Stillwater County, property in their continuing search for platinum-group-metal deposits. Beartooth Platinum Corp., Toronto, Ontario, Canada, continued exploration activities in the Fishtail Creek area. Following geologic mapping of the area and the completion of a soil sampling program, the company conducted diamond drilling tests totaling 885 m but failed to intercept their target. It was anticipated that the drilling program would continue in 2006.

Graymont Western US, Inc., Bellingham, WA, initiated an 1,800-m diamond-drill exploration program to examine limestone resources on and adjacent to the National Guard firing range in Broadwater County. This was in conjunction with a proposal to transfer the management of the firing range from the U.S. Bureau of Land Management to the U.S. Army Corps of Engineers. Preliminary results of the drilling showed that the grade and thickness of the resources increased to the southwest near Radersburg.

## Commodity Review

### *Industrial Minerals*

**Cement.**—Near Three Forks, Holcim Ltd., Zurich, Switzerland, had a banner year at its Trident cement plant. Production was the highest in 6 years and all products were sold out. The company initiated rationing because of production shortfalls. Current consumption and production rates were projected to continue into 2006. The company's alternative fuel draft environmental impact statement was expected to be released in November or December 2006.

Modifications to the kiln dust recovery system at the Trident plant were expected to allow more dust to be sold as usable product material instead of being placed in a landfill. Holcim also leased the Sheep Creek iron deposit north of White Sulphur Springs. The company planned to campaign the mining of about 14,500 t of iron ore every other year and to maintain a stockpile at the cement plant.

**Garnet.**—Ruby Valley Garnet, LLC encountered some difficulties in quality control during 2005 at its plant near Alder. Under a new mill manager, the company subsequently undertook an extensive redesign of the recovery facilities. The plant was expected to be back in production by the second quarter of 2006 with the ability to produce blast, filtration, and waterjet media far superior to those previously produced. The grade of garnet at Ruby Valley appears to be more than 20% in the placer and somewhat higher in the newly discovered lode deposit. There currently is an estimated 30-year reserve in the placer, assuming a production rate of 18,000 metric tons per year (t/yr) of product. In general, the market demand for garnet far exceeds production in the northwestern United States. A small company such as Ruby Valley is positioned to compete for a significant portion of the garnet market.

**Lime.**—East of Townsend, Graymont Western continued production at its Indian Creek burnt lime operation. Demand remained firm during the year as the plant production level

reached an estimated 70% of capacity. Sales have increased steadily during the past 3 years, and prices have been fairly stable. The Graymont operation currently provides 23% of the Broadwater County tax base.

**Talc.**—Barretts Minerals, Inc. continued production at its talc plant and at two mines south of Dillon. Operations were focused at the Regal Mine while stripping of a slide was completed at the Treasure Mine. At the Regal Mine, the county road was scheduled to be redirected during the summer of 2006. Upon completion, the road will serve to separate the public from the mine production area and will increase safety for all parties. The company began the permitting process for a dump and a discharge system and has received a permit for an ore-staging pad on the Stone Creek road. A new contractor will move ore from the pit to the staging area in 40-ton articulated trucks.

At the talc processing facilities, improvements were completed in the medium-grind circuit and in the packaging system. The products produced by Barretts Minerals are used in the matrix of catalytic converters, and in ceramics, construction materials, paints and coatings, pharmaceuticals, and plastics. The market was strong in these end-use sectors, showing a 10% increase in demand for the year. A shift toward the use of domestic rather than imported ores as feed material was noted. In addition, some interest was shown for using chloritic ores.

Luzenac America Inc. produced talc from its Yellowstone Mine south of Ennis. During the year several new pieces of equipment were acquired, and employment was increased. In addition, a permitting process was begun to expand the waste-rock dump, and a mine stripping project was completed. Luzenac was to be reorganized under Rio Tinto Minerals along with U.S. Borax Inc. (Rio Tinto Minerals, 2005).

## **Metals**

**Copper, Molybdenum, and Silver.**—In northwest Montana, the Troy copper-silver mine operated by Genesis, Inc. (a subsidiary of Revett Silver Company, Spokane, WA) showed steady improvements. Diamond drilling results along the periphery of the existing deposit increased total proven and probable ore reserves from 7.9 to 10.9 Mt. Production lingered for many months at 2,270 metric tons per day (t/d) but appeared to be increasing by yearend. Although staffing was below full employment level for most of the year as a result of a tight labor market, the company was optimistic that a production level near the budgeted 5,900 t/d would soon be reached.

Operations were expected to continue on all three of the stacked ore bodies at the Troy Mine. All the new equipment ordered was received and placed into operation. Other than some difficulty in receiving parts in a timely manner, the operation appeared to be resolving the problems associated with new equipment and startup. The company was waiting for a new biological opinion from the U.S. Fish and Wildlife Service following a court case, which suspended their operating permit on the Rock Creek project based on an insufficient study of the environmental impacts on grizzly bear and bull trout. The opinion was expected to be issued before the second quarter of 2006 and development of the Rock Creek evaluation decline was expected to be underway before the yearend. The Rock Creek

Mine would produce copper and silver from a stratiform deposit that underlies the Cabinet Mountain Wilderness.

On the east side of the Cabinet Wilderness south of Libby, Mines Management Inc., Spokane, WA, submitted a plan to mine the Montanore copper-silver deposit. A permit for this deposit was previously issued to the former Noranda Mining Company, Toronto, Ontario, Canada. Mines Management was awaiting the issuance of an environmental impact statement and a record of decision on the plan that was nearly identical to the plan previously approved for Noranda. The company finished a prefeasibility analysis and expected to complete a full feasibility study by late 2006.

The Contact Mill, a custom ore processing facility in Philipsburg that was owned by the Contact Mining Company, processed about 1,800 t of high-grade molybdenum ore from Winn-Eldridge's Ashdown Mine near Denio, NV. The mill is one of the few custom ore processing mills in the western United States. It has a processing capacity of 910 t/d in the grinding and flotation circuit and 455 t/d in the gravity separation circuit. A regrind circuit was completed in the third quarter, and a new unit was installed for drying the concentrates.

In Butte, Montana Resources, Inc. produced copper, molybdenum, and silver from the Continental Pit Mine. Ore grades remained steady at 0.20% copper and 0.025% molybdenum. Assembly of a 31-cubic-meter electric shovel was completed and placed into production in late summer. Significant improvements were made at the mill in upgrading the electric circuitry and computer controls. A plan was also in place to upgrade the ancillary equipment at the mine and mill during 2006.

Montana Resources also began investigating the feasibility of starting production in the supergene zone between the Berkeley Pit and the Continental Pit. Pumping tests were started late in 2005 and a drilling program was planned for 2006. Pending favorable results, production of copper was expected to be substantially increased at the mine.

**Gold.**—Near Whitehall, Placer Dome, Inc., Vancouver, British Columbia, Canada, operated the Golden Sunlight Mine. In the stripping process for the stage 5B expansion, a low-grade ore body was encountered. This allowed the company to reopen the mill in January. The reserves for 2005 were slightly less than 10 Mt at a grade of 2.19 g/t gold. The reserves were estimated to be 7.6 Mt at a grade of 2.78 g/t gold for 2006. Placer Dome planned to reopen the underground mine in November 2006 and to mine the open pit and underground sections at the same time until closure, which is scheduled after 2009.

The company had conducted exploration activities at the mine site and had identified four targets to be drilled in 2006. They hoped to identify all available reserves onsite prior to decommissioning the facility.

During 2005, some pit-wall stability problems were encountered on the west side of the pit. These appeared to be caused by wedge failures and ground water pressures. The company subsequently established a sophisticated computer-controlled continuous monitoring system of the pit walls for the safety of the employees.

**Lead and Zinc.**—Colorado-based Apollo Gold Corporation briefly resumed full production at the Montana Tunnels open

pit gold mine north of Boulder, where gold and silver dore and lead-gold and zinc-gold concentrates were produced. After completing an extensive stripping project, the company settled into production from the main diatreme ore zone. However, pit-wall stability problems from toppling of waste rock on the east and south walls resulted in damage to two pickup trucks and a haul truck, causing the company to shut down mining operations. A geotechnical consultant was then hired to survey the problem and suggest a solution. The pit was redesigned, which resulted in a reduction of the slope angle of the problem walls while prestripping for the next mining stage. Subsequently, a profitable processing of rock from the waste dump was resumed at the mill during the third quarter of the year. Efforts to acquire sufficient funds to resume a full stripping project at the mine were begun late in the year.

**Platinum-Group Metals.**—Stillwater Mining Company was well into a significant development program at its East Boulder platinum-group-metals mine where cobalt, copper, gold, and nickel also were recovered. The longest, largest-diameter, single-pass Alimak raise in North America was completed and construction of a second raise was initiated during the year. The overall development program included construction of primary ramps and an upper-level sand backfill plant, as well as diamond drilling. The completed ventilation raise facilitated the ventilation needed for the rest of the development.

The shallow-dipping (approximately 45° to 50°) mineralized zone resulted in extensive ore dilution when longhole mining methods were used. The company continued to test Coeur d'Alene type cut-and-fill mining methods or some modification thereof with success. Mine production reached nearly 1,200 t/d, with both ore grade and percent metal recovery remaining stable. Results of diamond drilling indicated a substantial increase in ore reserves at the East Boulder Mine.

The production level at Stillwater Mining Company's Stillwater Mine near Nye was maintained during the year as the company continued with exploration and development programs to expand reserves. Employment of adequate numbers of skilled miners, and timely acquisition of certain supplies remained as problems affecting overall operations at the facilities.

Stillwater's smelter capability was expanded to include the recycling of catalytic converters from automotive salvage. The catalytic converter cores are used as part of the flux for processing the mine concentrates.

## Legislation and Government Programs

The Montana Environmental Information Center and the Fort Belknap Tribe petitioned the Department of Environmental Quality to change the permitting regulations for mining

projects. Specifically, the petition requested revision of the permitting regulations to state that projects unable to prove that no further water treatment would be necessary 2 years after final reclamation should not be permitted. It was the collective opinion of the mining industry, however, that if this revision were to be made, no further metal mining project permits would be issued. Industrial minerals mining projects also could be prohibited under the revised permitting regulations if nitrates from waste-rock dumps and reclamation sediment were considered to require some passive water treatment. This pending issue was causing considerable concern for the existing mining industry, as well as for the exploration companies either currently conducting or planning to conduct exploration and development activities within the State.

The Underground Miner Training Project students at Montana Tech completed 61 m of decline and drift at the Orphan Girl Mine in Butte. Blue Range Engineering reopened the 30-m level at the mine and was in the process of developing an underground mine exhibit that was expected to open in the summer of 2006. This work was done at the World Museum of Mining as part of its new theme that documents the technological development of the mining industry over time.

The Montana Bureau of Mines and Geology continued its active participation in the STATEMAP program, a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP), through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: FEDMAP, which funds Federal geologic mapping projects, STATEMAP, which is a matching-funds grant program with State geological surveys, and EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. During 2005, mapping geology was carried out in western and southwestern portions of the State under both the STATEMAP and EDMAP programs. Many of the activities were designed to create more detailed 1:100,000 and 1:24,000-scale maps from 1:250,000-scale maps previously published. Development of a new State geologic map was progressing with a finished product expected in the near future. Field mapping of both gold and sapphire placers was continuing, although the completed reports were not immediately anticipated. Current publications and activities can be accessed at <http://www.mbgm.mtech.edu/>.

## Reference Cited

Rio Tinto Minerals, 2005, World leaders in borates, talc and salt combine to form Rio Tinto Minerals: Valencia, California, Rio Tinto Minerals press release, November 8, 1 p.

TABLE 1  
NONFUEL RAW MINERAL PRODUCTION IN MONTANA<sup>1,2</sup>

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	2003		2004		2005	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, bentonite	181	14,900	102	8,400	128	5,440
Gemstones	NA	707	NA	653	NA	644
Palladium <sup>3</sup> kilograms	14,000	91,400	13,700	102,000	13,300	87,100
Platinum <sup>3</sup> do.	4,170	93,100	4,040	110,000	3,920	113,000
Sand and gravel, construction	15,200	74,200	14,400	80,000	14,000	83,600
Stone:						
Crushed	3,060	12,200	4,090	13,700 <sup>r</sup>	3,540	16,800
Dimension	14	2,590	14	2,550	12	2,620
Combined values of cadmium (byproduct in zinc concentrates [2004-05]), cement [masonry (2003, 2005), portland], clays (common), copper, garnet (industrial [2005]), gold, lead, lime, molybdenum concentrates, peat, silver, talc (crude), zinc	XX	205,000	XX	303,000 <sup>r</sup>	XX	538,000
Total	XX	494,000	XX	621,000 <sup>r</sup>	XX	847,000

<sup>r</sup>Revised. NA Not available. XX Not applicable.

<sup>1</sup>Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

<sup>2</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>3</sup>Recoverable content of ores, etc.

TABLE 2  
MONTANA: CRUSHED STONE SOLD OR USED, BY KIND<sup>1</sup>

Kind	2004			2005		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone	8	2,960	\$9,820 <sup>r</sup>	4	2,550	\$12,500
Marble	2	W	W	--	--	--
Granite	3	W	W	3	W	W
Sandstone and quartzite	2	43 <sup>r</sup>	189 <sup>r</sup>	1	34	164
Traprock	2	212	822	2	W	W
Volcanic cinder and scoria	1	W	W	1	W	W
Miscellaneous stone	10 <sup>r</sup>	140 <sup>r</sup>	514 <sup>r</sup>	12	254	1,010
Total	XX	4,090	13,700 <sup>r</sup>	XX	3,540	16,800

<sup>r</sup>Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable. -- Zero.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3  
MONTANA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2005, BY USE<sup>1</sup>

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Concrete aggregate (+1½ inch), riprap and jetty stone	W	W
Coarse aggregate graded:		
Concrete aggregate, coarse	W	W
Railroad ballast	W	W
Coarse and fine aggregates:		
Graded road base or subbase	W	W
Crusher run or fill or waste	W	W
Other construction materials	30	240
Agricultural, poultry grit and mineral food	W	W
Chemical and metallurgical:		
Cement manufacture	W	W
Lime manufacture	W	W
Sulfur oxide removal	W	W
Special, mine dusting or acid water treatment	W	W
Other miscellaneous uses and specified uses not listed	195	845
Unspecified: <sup>2</sup>		
Reported	127	543
Estimated	1,500	7,000
Total	1,600	7,490
Grand total	3,540	16,800

W Withheld to avoid disclosing company proprietary data; included in "Grand total."

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Reported and estimated production without a breakdown by end use.

TABLE 4  
MONTANA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2005, BY USE AND DISTRICT<sup>1</sup>

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch) <sup>2</sup>	W	W	W	W	--	--
Coarse aggregate, graded <sup>3</sup>	W	W	W	W	--	--
Coarse and fine aggregates <sup>4</sup>	W	W	W	W	--	--
Other construction materials	30	237	(5)	3	--	--
Agricultural <sup>6</sup>	--	--	W	W	--	--
Chemical and metallurgical <sup>7</sup>	W	W	W	W	--	--
Special <sup>8</sup>	--	--	W	W	--	--
Other miscellaneous uses	--	--	195	845	--	--
Unspecified: <sup>9</sup>						
Reported	126	539	--	--	1	5
Estimated	1,300	6,500	127	462	--	--
Total	2,630	12,600	900	4,250	1	5

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Includes riprap and jetty stone.

<sup>3</sup>Includes concrete aggregate (coarse) and railroad ballast.

<sup>4</sup>Includes crusher run or fill or waste and graded road base or subbase.

<sup>5</sup>Less than ½ unit.

<sup>6</sup>Includes poultry grit and mineral food.

<sup>7</sup>Includes cement and lime manufacture and sulfur oxide removal.

<sup>8</sup>Includes mine dusting or acid water treatment.

<sup>9</sup>Reported and estimated production without a breakdown by end use.

TABLE 5  
MONTANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2005,  
BY MAJOR USE CATEGORY<sup>1</sup>

Use	Quantity	Value	Unit
	(thousand metric tons)	(thousands)	value
Concrete aggregates and concrete products <sup>2</sup>	1,030	\$8,120	\$7.86
Asphaltic concrete aggregates and other bituminous mixtures	852	10,700	12.54
Road base and coverings	3,160	16,800	5.32
Fill	967	4,540	4.70
Snow and ice control	45	164	3.64
Other miscellaneous uses <sup>3</sup>	662	3,100	4.68
Unspecified: <sup>4</sup>			
Reported	2,380	12,600	5.31
Estimated	4,900	27,500	5.62
Total or average	14,000	83,600	5.97

<sup>1</sup>Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

<sup>2</sup>Includes plaster and gunite sands.

<sup>3</sup>Includes railroad ballast.

<sup>4</sup>Reported and estimated production without a breakdown by end use.

TABLE 6  
MONTANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2005, BY USE AND DISTRICT<sup>1</sup>

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products <sup>2</sup>	844	6,870	188	1,260	--	--
Asphaltic concrete aggregates and other bituminous mixtures	W	W	W	W	123	510
Road base and coverings	2,120	12,500	724	2,770	323	1,550
Snow and ice control	45	164	--	--	--	--
Other miscellaneous uses <sup>3</sup>	2,210	17,300	146	538	--	--
Unspecified: <sup>4</sup>						
Reported	694	3,800	1,690	8,830	1	5
Estimated	4,000	22,300	900	5,200	--	--
Total	9,870	62,900	3,670	18,600	447	2,070

W Withheld to avoid disclosing company proprietary data; included with "Other Miscellaneous Uses. -- Zero.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Includes plaster and gunite sands.

<sup>3</sup>Includes fill and railroad ballast.

<sup>4</sup>Reported and estimated production without a breakdown by end use.